The Influence of Biosurfactants from Probiotic Bacteria on the Formation of Voice Prosthetic Biofilms

Lígia Rodrigues,[1] Henny C. van der Mei,[2] José Teixeira,[1*] and Rosário Oliveira[1]

[1]Centro de Engenharia Biológica, Universidade do Minho, Largo do Paço, 4719 Braga Codex, Portugal,

[2]Department of Biomedical Engineering, University of Groningen Antonius Deusinglaan 1, 9713 AV Groningen, The Netherlands.

The two major reasons for failure of silicone rubber voice prostheses due to biofilm formation are leakage or increased airflow resistance. Biosurfactants are surface-active compounds released by microorganisms that have the ability to interfere in microbial adhesion processes and can also exhibit antimicrobial activity against various microbes, being this item of great importance since patients with silicone rubber voice prostheses are mainly benefited by a frequent and long-term "antibiofilm" therapy. The antimicrobial activity of biosurfactants obtained from probiotic bacteria, *Lactococcus lactis* 53 (biosurfactant 1) and *Streptococcus thermophilus* A (biosurfactant 2), against a variety of microorganisms isolated from explanted voice prostheses was investigated. Both biosurfactants showed antimicrobial activity and worked in a similar way but, depending on the microbial strain, there are different effective concentrations that must be employed. Thus, a concentration of 100 mg/ml of biosurfactant solutions was chosen for pre-conditioning the voice prostheses. Biofilms were grown on pre-conditioned voice prostheses in an artificial throat model and it has been demonstrated that both biosurfactants greatly reduced microbial numbers on prostheses and also induced a decrease in the airflow resistance of voice prostheses after biofilm formation. This study shows that pre-conditioning silicone rubber voice prostheses with biosurfactants obtained from probiotic bacteria is a promising strategy for prolonging the lifetime of voice prostheses.